PROJECT IN RESEARCH IN UNIVERSITIES

Some Factors in the Adjustment of College Students

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Foreword

THIS BULLETIN is one of a series of publications reporting the findings of investigations undertaken during 1936–37 under the project in research in universities of the Office of Education. The project was financed under the Emergency Relief Appropriation Act of 1935, and conducted in accordance with administrative regulations of the Works Progress Administration. Study findings in addition to those reported in this bulletin will be made available in other Office of Education or institutional publications.

The Project in Research in Universities represents a unique and significant innovation in cooperative research. Sixty universities and comparable institutions located in 32 States, the District of Columbia, and Hawaii combined efforts with the Office of Education to conduct 40 studies, 23 of which were proposed by the Office and 17 by the institutions. Each institution was invited to participate in all of the approved studies that it was in a position to undertake. From 1 to 14 studies were conducted in each institution, and a total of more than 150 separate study reports were made to the Office of Education.

An important feature of the project was the widespread and coordinated attack on each problem by a number of universities at the same time. Each study proposed by the Office of Education and accepted by the universities was conducted by two or more institutions. As many as 31 institutions, located in 20 States representative of each major geographical division of the country, participated in one study alone. The task of planning, administering, and supervising the many projects and studies on a national scale, under complex and often difficult conditions, demanded the finest type of cooperative endeavor. Except in two places where qualified relief workers could not be found or retained, every institution which actually began work on the project carried it through to successful completion. The fine professional spirit in which responsibility for the work was accepted and maintained by the institutions made possible the successful completion of the project within approximately 1 year.

With this professional spirit of cooperation in worth-while research and study of educational problems, was manifested a strong humanitarian desire to join hands with Federal agencies striving during the years of the depression to afford gainful and socially desirable employment to college graduates or former college students in the type of work for which they were best prepared. For these contributions to educational research and to the social good of the Nation, the Office of Education extends to its colleagues and helpers in the universities of the country its grateful acknowledgment and appreciation.

This particular study is a report of investigations in different colleges or universities of the adjustment values of certain facts which are usually known about entering college students. Because of the large numbers of cases and the geographical distribution of the participating institutions, the findings can be interpreted with considerable assurance. Because of the extensiveness of the data they may also be of value to others in making further interpretations and comparisons. Guidance workers in secondary schools and colleges, and also college administrators and curriculum consultants who are concerned with improving the college program, will find in the report much suggestive material.

BESS GOODYKOONTZ,
Assistant Commissioner of Education

Some Factors in the Adjustment of College Students

ASSUMING that education today is aiming toward the development of the individual and betterment of society, rather than toward the perfection of the mechanism of school organization, it behooves educators to discover and develop those practices which help a student to "find himself" and best fit him for his place in society. Only by adjusting the school system and instructional material to meet the needs of the student can this be accomplished.

This demand for individual guidance is being met in part by personnel divisions that have been established in many schools. Some of the services rendered by such divisions are the analysis of the individual's attainments, capabilities, and interests by means of tests, questionnaires, and interviews, the advising of students through individual or group guidance, and arranging for remedial work.

These services are not always carried on by a personnel division so designated, however. Actually there is probably more personnel work being carried on outside the regularly organized college personnel services than within such departments. Indeed it seems probable that in some institutions the regular personnel services are mainly an agency to organize the potentialities of a university in this regard, aid in directing its effort, and act as a central clearing house to avoid overlapping of work between different agencies in college dealing with personnel problems. For example, at the University of Minnesota [1] where the University Testing Bureau is the centralizing personnel agency, the following agencies and officers are maintained for aiding in the job of counseling students:

Dean of women.
Dean of student affairs.
Assistant dean of men.
University board of admissions.
Committees on admissions of the various colleges.

[1] Williamson, E. G. *and* Darley, J. G. Student personnel work. New York, McGraw-Hill Book Co., 1937.

College advisors, faculty counselors, probation advisors and students' work committees, departmental advisors, department heads, deans, and faculty members.
How-to-study classes.
Vocations class.
Employment bureau, bureau of recommendations, faculty members in charge of placement of seniors.
Speech clinic.
Student health service.
University psychiatrist and psychiatric social worker.
Freshman Week Committee.
Registrar.
University Y. M. C. A.
University Y. W. C. A.
Committee on educational research.
University testing bureau.

There has been a great increase in personnel services during the last few years in secondary schools, colleges, and universities. Walters in a report [2] to the American College Personnel Association in 1932 stated that 85 out of 563 colleges of all sizes had made provision for regular personnel service. The range in number of people working on the personnel staffs was from 1 part-time worker to 18 full-time persons. Since 1932, many other colleges have inaugurated such special services. Also it must be noted that many colleges do considerable guidance work without having a regular personnel service so named and specially charged with carrying on personnel activities. For example, at the University of Washington, of 1,008 students interviewed by the registrar only 114 stated that they had received no advice from faculty or other employees of the university. The position of the advisor and number of students receiving advice from each are as follows:

Advisor	*Number of students*
Clerk	430
Associate	5
Instructor	30
Assistant professor	29
Associate professor	40
Professor	295
Dean	65
Not receiving advice	114
Total	1,008

Because of this growing interest in and need for student guidance, the study reported upon here, carried on by 13 universities,[3] was directed toward

[2] Walters, J. E. A study of personnel activities in the colleges and universities that are members of the American College Personnel Association. Report of ninth annual meeting of the American College Personnel Association, 1932.

[3] The 13 universities are named on the inside cover pages of this bulletin.

the solution of problems in that area. It is concerned principally with the values of data transmitted by high schools to colleges concerning individual students. The proposal made by the Office of Education was in part as follows:

Description of study and procedure.—The subjects taken in high school, the marks made in such high-school subjects and other ratings furnished by the principal are recorded in most college registrars' offices. These high-school records, together with the courses taken and marks in college, are to be recorded in such form as will best show the presence or absence of relationships between the high-school factors and success in college.

Tabulation forms and scatter-grams upon which marks made in high school in different subjects and marks made in college are listed and upon which character ratings and marks made in different college subjects are listed will be described or furnished cooperating institutions. The correlation method will be the appropriate method of revealing relationships in some cases, while in others an analysis of the situation will be appropriate.

Some institutions desired to depart from the original proposal, to include other information about pupils which their institutions were able to get about entering college students. These variations were approved in practically all cases by the Office of Education, since it was desired above all to have the research deal with the real situation in the institutions.

More detailed suggestions for making the study were sent to the schools after they had accepted the study and had begun to gather the data. The main gist of these suggestions was that where possible correlational analyses of the data should take place. In most cases institutions followed these suggestions to the extent of calculating zero order coefficients. In one case because of the pressure of work, scatter diagrams only were submitted. The present authors calculated the correlation coefficients in this case. Data not easily analyzed by the correlational method were also presented and these have been used in the present report. The facts shown here and their interpretation for use in the improvement of the adjustment of college youth should be of interest to personnel workers and college administration officers of various types. Since references in the field of personnel methods are available, no general discussion of such methods will be given.[4]

ARTICULATION OF HIGH-SCHOOL AND COLLEGE SUBJECT AREAS

There is a recognized need for better articulation between the high-school and college curriculums. Too often the only ties of consequence are the

[4] Strang, Ruth. Personnel development and guidance in college and secondary school. New York, Harper and Bros., 1934.

Walter, Jack E. Student development, New York, Isaac Pitman & Sons, 1931.

——— Individualizing education by means of applied personnel procedures. New York, John Wiley & Sons, 1935.

Williamson, E. G. *and* Darley, J. G. Student personnel work. New York, McGraw-Hill Book Co., 1937.

subject requirements which the colleges make. Furthermore, not only is there an actual lack of articulation in subject sequences for the two types of institutions but there is little preparation of high-school pupils for choosing college subjects. This problem is acute for students who plan to attend any college where freshmen are presented with a large array of subjects from which to select a schedule of classes.

Evidence bearing on this point is submitted by the University of Louisville for pupils entering in the years 1932, 1933, and 1934 (table 1). The students probably chose subjects in college to some extent because they were successful in those subjects in high school. This, however, limits the choice of subjects in college. This conclusion regarding the subjects chosen seems apparent after examining table 1. Most of the choices are in those high-school subjects which are either required or have a large following in high school. These are history, English, romance languages, chemistry, biology, and home economics.

TABLE 1.—*Major subjects chosen in college, with number of high-school semesters spent on each* from the University of Louisville

Major subject chosen in college	Students classified according to the number of semesters of same subject taken in high school			Total number of students choosing this major subject
	0–3 semesters	4–7 semesters	8–11 semesters	
1	2	3	4	5
History	70	11	0	81
Political science	33	5	1	39
Economics	40	0	0	40
Sociology	14	0	0	14
Education	0	0	0	0
English	5	106	0	111
Romance languages	28	13	0	41
German	1	0	0	1
Ancient languages	0	0	0	0
Philosophy	1	0	0	1
Music	9	0	0	9
Mathematics	13	26	0	39
Psychology	1	0	0	1
Chemistry	143	0	0	143
Biology	52	1	0	53
Physics	2	0	0	2
Home economics	39	4	0	43
Physical education	1	0	0	1

When subjects taken in high school and college are the same, there is often duplication in college of the contents of the high-school courses. At

the University of Washington, out of 1,000 freshmen; all except 45 reported repetition of subjects. Although only a portion of this was regarded by the students themselves as wasteful, there was ample evidence of a lack of articulation. Although it was admitted that, in general, the university courses were advanced, there was no denying that they covered the same ground as the high-school courses and that in many cases the same methods were used. Most of the students did not object to this duplication. They lost no credit, and they had an opportunity to take subjects which were easy to carry and in which satisfactory grades might be secured. Repetition has been defended on the theory that greater familiarity is acquired by going over the subject matter a second time. If this repetition were well planned and used as background material at the outset, or at intervals during the courses, the repetition could certainly not be criticized. However, at the University of Washington the average grades of students increased only from 2.16 for those who had no repetition of subject matter to 2.25 for those who were carrying one repeated subject and to 2.27 for those with more than one. Such small differences are not significant. However, it was found that among serious-minded students much irritation and marking of time during the freshman year were caused by these repetitions. Practically every student who had done better than average work in high school experienced a period of critical unrest. If a student had already done good work in the subject which he wished to continue in college, his first two quarters in college sometimes tended to deaden his interest in scholastic pursuits. Two hundred and six students indicated having had a high-school chemistry course which was duplicated by the university course in which they were enrolled.

There are three ways in which this problem of duplication between high school and college can be solved. One method is actually to articulate the various courses in both institutions so that a student graduating from high school will be placed in the class which corresponds to his level of learning in the subject chosen. This direct articulation through arrangement of course content in both institutions is, of course, difficult to achieve, because high schools are relatively independent of one another, and the colleges are independent of the high schools.

A second and more practical solution to this difficulty is for colleges to use placement tests and on the basis of test results place the student in the appropriate course. This would obviate the necessity for attempting to articulate the contents of high-school and college courses. The method of using tests is probably the more accurate method of student placement, because it involves placement according to an objective rating rather than on the basis of the fact that the student has finished a certain high-school course. The student may have passed such a course with high honors or

he may have attained only the minimum essentials. For example, consider the students who have taken 3 years of French in high school. A student who has just slipped through—barely getting the minimum essentials—knows probably only a small percent as much French as a student who has attained an A grade throughout the course. A placement test score for the latter would entitle him to enter an advanced class in college, whereas the test score for the former would entitle him to no advanced standing at all. A placement test result is therefore necessarily a more accurate description of the student's attainment than the certification of the fact that he has acquired credit in a course.

A third solution to the problem of articulation is the setting up in college of independent study plans whereby students may put their energy upon those phases of the subject which seem to require it. The University of Chicago plan is an example of this. Such a plan requires a drastic revision in the organization of the university as well as of the curriculum.

EXTRACURRICULAR ACTIVITIES

At Syracuse University an analysis was made of the honor-point average for the entire college course for students participating in various extracurricular activities in their high-school period. Data on this item are given in table 2. Many students participated in several activities. This is the reason why the number in the entire group does not correspond to the sum of students participating in each activity. Some participation in extracurricular activities seems to be the normal practice and, according to these figures, a positive rather than a negative factor for success in college. Athletics appears in these figures as the only activity unrelated to success in college.

For Massachusetts State College the data are given in table 3. These show no perceptible relationship between amount of participation in extracurricular activities in high school and success in the regular work of the college.

For the University of Washington the marks made in the first quarter of college by students in different activity groups in high school are given in table 4. This table shows the same trend as that given for Syracuse University. The activity students in high school make better marks on an average than those not engaging in activities, for all activities except athletics. The reader is especially cautioned against interpreting the trends in this section as causes. Causal relationships are not necessarily indicated. In this particular instance it is more than probable that the type of activity engaged in and the marks received are both due to some common factor such as general intelligence or general inclination to participate in group work and discussions.

TABLE 2.—*Participation in secondary school extracurricular activities and honor point average in entire college course*

[Adapted from Syracuse University]

Extracurricular activities in high school	Number of students	Median honor point	Extracurricular activities in high school	Number of students	Median honor point
Debating	269	[1] 1. 31	Athletics	747	1. 18
Other organizations	131	1. 25	Nonparticipants	40	1. 14
School publications	453	1. 24	Not responding to questionnaire	36	. 98
School and class offices	510	1. 23			
Religious organizations	605	1. 22	**Total**	**1,112**	**1.18**
Musical and dramatic	665	1. 21			
Camping and hiking	541	1. 21			

[1] The greater the median honor point the higher the scholarship.

TABLE 3.—*Average college mark for 4 years compared with amount of participation in extracurricular activities in high school*

[Adapted from Massachusetts State College]

Number of hours per week spent in extracurricular activities	Number of cases	Average college mark	Number of hours per week spent in extracurricular activities	Number of cases	Average college mark
1 to 5	43	[1] 76. 7	21 and over	10	74. 7
6 to 10	51	77. 0			
11 to 15	31	76. 0	**Total**	**149**	**76.7**
16 to 20	14	78. 2			

[1] The larger the percentage the higher the mark.

TABLE 4.—*First quarter college marks earned by students in various high-school activity groups*

[Adapted from University of Washington]

Activity	Number	First quarter college marks	Activity	Number	First quarter college marks
Major sports	269	[1] 2. 21	School clubs, French, radio, etc	234	2. 38
Minor sports	132	2. 29	Student offices	120	2. 38
Plays, operas, orchestra, etc	381	2. 35	Nonschool, Y. M. C. A., Y. W. C. A., Scouts, etc	18	2. 48
News writing, annual, etc	131	2. 53	Nonactivity	164	2. 26

[1] The larger the average the higher the scholarship.

The data at the University of Washington were also analyzed to show changes in scholarship occurring when students increased or decreased their extracurricular activity materially in changing from high school to college. Table 5 shows some interesting trends. The nonactive students in high school who remained inactive in college (group I) tended to keep to the same scholastic level, which in general remained fairly low. However, those students who were nonactive in high school and became active in college were still more consistent in scholarship in both high school and college. The scholarship of this group was higher than that of the first. This trend seems to indicate that there were some inactive students in high school who really had capabilities in extracurricular activities as well as in scholarship. An explanation of the change could easily be found in the fact that some high-school students did not have the opportunity to engage in any such activities in high school or were not mature enough to feel the urge to do so, whereas in college the opportunity arose and was seized.

TABLE 5.—*Scholastic standing of activity groups of students in high school and after entering college*

[Adapted from University of Washington]

Group	Number in group	Mark in high school	Mark in first quarter university	Correlations between high-school marks and first quarter-university marks
I. Nonactive in high school Nonactive in university	105	15.1	12.2	.57
II. Nonactive in high school Active in university	45	5.5	2.4	.20
III. Active in high school Nonactive in university	378	6.0	2.3	.25
IV. Active in high school Active in university	404	6.4	2.4	.58

[1] The larger the average the higher the scholarship.

The low correlation (.25) between the marks made in high school and college and the drop in scholarship from high school to college for the group (group III) which was active in high school and nonactive in the university, may indicate that, in some instances, at least, the popularity of the students in high school resulted in their obtaining better marks

than they deserved. These students suffered thereby when entering college where they were not able to cope with the larger social situation to their own advantage. Other students in this active group in high school (group IV) were also active in college. These students' marks in high school were fairly high and corresponded fairly closely with the marks they made later in college. This analysis suggests that participation in extracurricular activities in general accompanies adjustment and that anything which disturbs such activity also disturbs the attainment in scholarship.

DELAYED ADMISSION

Although delayed graduation from high school accounts for the greater number of students above the average age at entrance to college, there is a smaller group of students who, due to delayed admission, are also more advanced in age than the average college entrant. By delayed admission is meant that an interval of time has elapsed between graduation from high school and admission to college. It is important to investigate this smaller, more selected group of students who have been delayed in admission to college for other reasons than delayed high school graduation.

Data presented by the University of Washington show that delayed admission is not associated with poor scholarship (table 6). The determination which had existed in these individuals, whose entrance upon college work was delayed, to some time go to college, may have resulted in their becoming a selected group, whose maturity and earnestness of purpose apparently more than made up for the number of years engaged in nonacademic pursuits.

TABLE 6.—*Grade-point averages for the first quarter in college of groups of students delayed various numbers of years*

[Adapted from University of Washington]

Years delayed	Grade-point averages	Number of students	Years delayed	Grade-point averages	Number of students
7	[1] 2.98	22	2	2.32	290
6	2.96	9	1	2.42	600
5	3.00	12	0	2.34	1,868
4	2.43	67			
3	2.45	136	Total		3,004

[1] The larger grade-point average indicates the higher scholarship.

The University of Washington also calculated the correlation coefficients for three successive entering freshman classes between their scholarship in

their first quarter in college and the time elapsed between secondary school graduation and entrance to college. These coefficients were .08 for 1,007 students, .08 for 1,010 students, and .10 for 987 students. These results are simply another way of showing the same conditions as are shown in table 6. Syracuse University found a correlation coefficient between time elapsed between secondary school graduation and college matriculation and honor-point averages for all 4 years of college of .03 for 1,061 students. Both computations indicate that there is no relation between scholarship and delayed admission to college. The general conclusion must be that delayed admission in itself should be no bar to good college achievement.

AGE

Massachusetts State College submitted data (table 7) which show that the older the student at entrance to college the less likely he is to make good marks. The trend as between the 16-, 17-, and 18-year groups is not so pronounced as it is between those entrants above 18 and those in the lower age groups. On account of the small number of cases in the "over 18" group, no significant conclusion could be drawn from these data by themselves.

Syracuse University, analyzing the relation between age of entrance and success in college, found negative correlations, indicating that the older the student at matriculation the poorer his chances for success (table 8). The relationship is strongest in the regular "academic" subjects—science, education, and liberal arts.

At first glance it would seem that the findings given here are contrary to the findings in regard to the success of students delayed in their entrance to college reported upon in the previous section. Actually there is no contradiction, since, as explained in that section, the group of students delayed in entrance to college and the group of students who are relatively older at entrance are not, except in part, the same group. The older student-entrance group includes most, if not all, of the delayed entrance group, but in addition it includes the large number of students who graduated from high school at an advanced age and entered college directly thereafter. In fact, if these last-named students could have been segregated from the delayed admission group, the tendency shown in this chapter for older students to get lower marks in college would be much more pronounced.

TABLE 7.—*Average college marks by ages of students on entering college*

[From Massachusetts State College]

Age at entrance	Average college marks first year	Number of cases	Age at entrance	Average college marks first year	Number of cases
16	76.1	31	18	74.1	64
17	74.6	96	Over 18	68.4	21

Average college marks for all 4 years

Age at entrance	Average marks	Number of cases	Age at entrance	Average marks	Number of cases
16	77.0	26	18	77.1	52
17	82.8	105	Over 18	73.3	10

TABLE 8.—*Correlation coefficients between age at matriculation and honor-point average*

[From Syracuse University]

School	Number	Coefficient	School	Number	Coefficient
Applied science	120	−.38	Fine arts	130	−.19
Business administration	254	−.18	Liberal arts	399	−.24
Education	93	−.30	**Total**	[1] 1,112	−.37
Home economics	61	+.11			

[1] Includes 30 from School of Agriculture and 25 from School of Speech.

The University of Tennessee reported a correlation coefficient of −.26 between age at entrance to college and first-year college marks for 381 students and +.01 between age at entrance and the marks of students who had marks for 4 years' work. This indicates, for Tennessee at least, that although age is a handicap, it is one which may be overcome by application, since students of all ages who actually remained were not handicapped by the differing entrance ages.

The University of Detroit found the following correlations between age and success for the whole college course in the different divisions of the college: Arts and sciences (122), −.28; engineering (168), −.23; and commerce and finance (100), −.43.

The correlation coefficients for Syracuse University, Detroit University, and the University of Tennessee have been brought together for comparison (table 9).

The report showing the distribution of ages of entering college students for the University of Tennessee is reproduced here (table 10). The median age for admission is 18 years 4 months. A line has been drawn at the age of 19, dividing the students roughly into two groups—the lower group including those of fairly normal entrance age, and the upper, including the other students, many of whom may be handicapped in ability.

TABLE 9.—*Summary of correlation coefficients between age at entrance and success in college*

Institution	Number	Coefficient
Syracuse University	1,112	−.37
University of Tennessee	124	+.01
Detroit University:		
Arts and sciences division	122	−.28
Engineering division	168	−.23
Commerce and finance division	100	−.43
Total	**1,626**	*Median* **−.28**

TABLE 10.—*Number of students entering college at different age levels*

[From the University of Tennessee]

Age	Number	Age	Number
24 years or over	3	19 years 1 month to 19 years 4 months	40
23 years 1 month to 23 years 4 months	2	18 years 9 months to 19 years	20
22 years 1 month to 22 years 4 months	1	18 years 5 months to 18 years 8 months	38
21 years 9 months to 22 years	5	18 years 1 month to 18 years 4 months	44
21 years 5 months to 21 years 8 months	6	17 years 9 months to 18 years	42
21 years 1 month to 21 years 4 months	3	17 years 5 months to 17 years 8 months	38
20 years 9 months to 21 years	4	17 years 1 month to 17 years 4 months	37
20 years 5 months to 20 years 8 months	11	16 years 9 months to 17 years	17
20 years 1 month to 20 years 4 months	16	16 years 5 months to 16 years 8 months	5
19 years 9 months to 20 years	12	16 years to 16 years 4 months	9
19 years 5 months to 19 years 8 months	28		

THE SELF-SUPPORTING STUDENT

At the University of Washington 50 percent of the students interviewed were partly or entirely self-supporting (table 11). While in high school the self-supporting student participated in sports and other student activities to practically the same extent as did his fellows. His standing in his high-school class was somewhat below that of the non-self-supporting group, but it was not markedly so. In college, however, the self-supporting student dropped his activities to a large extent. The scholarship records for the freshman year showed that those who were self-supporting to the extent of 25 to 50 percent fell below standard; the 75 percent self-supporting made the same average as the non-self-supporting students; and the 100 percent self-supporting students actually made a higher record than did the non-self-supporting group. These facts should not be interpreted to mean that self-support is the ideal condition, especially when extracurricular activities which would develop the personality of the individual are sacrificed. The results do show, however, that for many students it is not a great handicap to be self-supporting in college.

TABLE 11.—*Degree of self-support for 1,027 freshmen who entered the University of Washington in the fall of 1931*

Percent of self-support	Number of students	Percent of self-support	Number of students
No self-support	514	75	93
25	184	100	117
50	119		
		Total	**1,027**

HIGH-SCHOOL MARKS

Relationships between various groupings of high-school and college marks have received considerable attention by the cooperating institutions, no doubt in large part because of the availability of the records of entering high-school students. It is because these marks are usually accessible that they, more than other factors, have been the subject of investigation in personnel research studies.

The reasons for investigating them in the present study follow.

(1) The relationship between the high-school and college marks may tend to change over a period of years, due to several influences. The use of objective measurements in either high school or college, or both, will tend to increase the relationship since their use tends to raise the reliability

of marks. If more students of lower I. Q.'s go to college and more students are failed, the relationship between high-school and college marks will tend to increase. However, as has been pointed out by Williamson,[5] as personnel work in college increases in efficiency the relationship between the two factors may decrease, because students are more likely to be guided into courses which they can master.

(2) The present study is based on more cases and institutions than other studies, thus affording an opportunity to analyze the results in a more detailed manner than in any study heretofore made.

Tables 12 to 21 give the details of these relationships through the use of the correlation coefficient.[6] The correlations reported here are all based upon actual averages of high-school marks, and not upon rank in high school, except where noted. Since different high schools had different schemes of marking, it was necessary to reduce all high-school marks for the students of each institution to a common standard. Most institutions reduced all high-school marks to a percentage basis. In calculating the coefficients, 8 or 9 steps for both high-school marks and college marks were used in practically all cases.

The median coefficient is calculated for each table or subtable. Since these coefficients are medians they are unweighted. It is believed that a median shows the general trend of the relationship better than a weighted average.[7]

In spite of the fact that in an institution of any size the practices of different instructors in emphasizing one or the other factor tend to neutralize one another, there is likely to be left some tendency for each institution to determine marks more upon one factor than another. It is thought, therefore, that the simple median of the correlation coefficients from different institutions is more representative than any other average which might be found.

The reason for using the coefficients from different divisions of a college or university in the median was based on this same reasoning. In fact,

[5] Williamson, E. G. The decreasing accuracy of scholastic predictions. Journal of educational psychology, 28; 1-16, January 1937.

[6] The relationship between marks in various high-school groups and various college groups is usually rectilinear and therefore the Pearson correlation coefficient is the proper index to use in showing relationships. Marks distributions are usually somewhat skewed, but since they are all generally skewed in the same direction, this does not affect the rectilinear relationship. A large number of scatter diagrams from which the correlation coefficients in this study were calculated were examined. These conformed to the pattern mentioned.

[7] The following reasoning is advanced for the statement made: Each institution may have certain characteristics in its marking. One institution might, for example, pay more attention to oral work and social qualities displayed than to the intellectual characteristics of students. This may also be true for the high schools in the different parts of the country from which these institutions draw their students. Ben D. Wood in *Measurement in Higher Education* (World Book Co., 1923) has listed the bases on which individual instructors mark their students. These are: (1) Effort put forth by the individual student; (2) general intelligence of the student; (3) general character and personality of the student; (4) general fitness of the student to live in civilized society; (5) amount of improvement of the student: (a) In general and (b) in specific course or courses; and (6) Actual achievement of the student.

different divisions in the same university might easily differ more than different institutions in their marking practices.

Extensive comments on each of these 10 tables will not be made. The detailed results shown in them are reproduced partly to enable research workers to make use of the results in other studies and reports, and partly to show the extensiveness of the data.

The relationships established between average high-school marks and average college freshman marks are the first to be presented (table 12). The highest coefficient obtained was .66 with 763 cases at the University of Illinois, and the lowest was .35 with 381 cases at the University of Tennessee. The median of the correlations is .52. These correlations are in line with the results of previous investigations made on much smaller numbers of cases.[8]

TABLE 12.—*Correlation coefficients obtained between average high-school marks and average college freshman marks*

Institution	Number of cases	Coefficient
University of Illinois	763	.66
Marquette University:[1]		
Business administration division	111	[illegible]7
Engineering division	132	[2].60
Journalism division	72	[2].60
Liberal arts division	375	[2].57
Rensselaer Polytechnic Institute	392	.49
Rutgers University	192	.51
University of Tennessee	381	.35
University of Washington	[3]7,986	[3].52
Total	[5]**10,404**	[5][6]**.52**

[1] High-school rank in graduating class was used instead of average high-school marks.
[2] Marquette University college marks were first-semester marks only.
[3] The University of Washington correlation coefficient .52 is the mean for four entering classes as follows:

Year	Number of cases	Coefficient	Year	Number of cases	Coefficient
1932	1,719	.49	1935	2,258	.52
1933	1,755	.56			
1934	2,254	.52	Total	7,986	*Mean* .52

[4] The University of Washington college marks were first quarter marks only.
[5] As indicated in the text, the median coefficient has been calculated from the coefficients occurring in the body of the table and is not therefore a coefficient obtained directly from the total number of cases.
[6] Median.

The correlation coefficients showing the relationship between average high-school marks and average marks of the *full college course* (table 13) have

[8] For a survey of previous investigations of this character, *see* Segel, David. Prediction of Success in College, Washington, United States Department of the Interior, Office of Education Bulletin, 1934, No. 15.

a narrower range than those shown above for average college freshman marks. This is no doubt because the averages for all 4 years are more stable than the averages for 1 year—being based on a greater number of marks.

TABLE 13.—*Correlation coefficients obtained between average high-school marks and average marks for the full college course of 4 years*

Institution	Number of cases	Coefficient
University of Detroit:		
Arts and sciences division	409	.65
Commerce and finance division	100	.47
Engineering division	168	.49
University of Illinois	863	.49
University of Louisville	442	.49
Rensselaer Polytechnic Institute	212	.40
Syracuse University	240	.43
University of Tennessee	124	.46
Washington University	611	.54
Total	**3,169**	[1].49

[1] Median.

Most investigators of marks have confined their investigations to the use of average high-school marks. More investigations are needed which show the relationships between marks in specific high-school subjects and the same or other subject groups in college. The results of this type of investigation are needed more and more in order to place advice regarding the choice of college subjects and courses upon a more objective basis. With the increase in range of general ability of entering college students, a consideration becoming progressively more important is to determine the line of their greatest interests and capabilities. This study reports a large number of relationships established between marks in specific high-school subjects and marks in specific college subjects (tables 14–21). In order to show the trends more clearly the median coefficients have been brought together in one table for ease of interpretation (table 22).

The theoretical relationships resulting when the correlation coefficients are corrected for attenuation have been calculated for those who are interested (table 23). These corrected coefficients,[9] although originally being single medians of other correlations, because of the large number of cases represent the relationship between the variables fairly accurately.

[9] A reliability of .60 was used in the attenuation formula. This correlation of .60 is an estimated typical figure based on a study of the results of studies of the reliability of college marks reported in the literature.

TABLE 14.—*Correlation coefficients obtained between marks in high-school English and various groupings of college marks*

Institution	Number of cases	Coefficient
High-school English and average college freshman marks		
Iowa State College	434	.46
Massachusetts State College	231	.34
Rensselaer Polytechnic Institute	393	.33
Rutgers University	193	.42
University of Tennessee	381	.33
Total	**1,632**	**[1].34**
High-school English and average college marks for all 4 years		
Iowa State College	29[illegible]	.36
Massachusetts State College	166	.43
Rensselaer Polytechnic Institute	213	.40
University of Tennessee	124	.42
Washington University	608	.47
Total	**1,408**	**[1].42**
High-school English and college biological science		
University of Detroit:		
Arts and sciences division	168	.48
University of Illinois	453	.64
Iowa State College	266	.37
Massachusetts State College	220	.35
Total	**1,107**	**[1].42**
High-school English and college economics		
Iowa State College	304	.34
Massachusetts State College	200	.18
Rensselaer Polytechnic Institute	36[illegible]	.32
Total	**871**	**[1].32**
High-school English and college English		
University of Detroit:		
Commerce and finance division	96	.52
Engineering division	168	.23
University of Illinois	824	.54
Iowa State College	427	.46
Rensselaer Polytechnic Institute	410	.35
Total	**1,925**	**[1].46**

[1] Median.

TABLE 14.—*Correlation coefficients obtained between marks in high-school English and various groupings of college marks*—Continued

High-school English and college foreign languages

Institution	Number of cases	Coefficient
University of Detroit:		
Arts and sciences division	215	.57
Commerce and finance division	91	.61
University of Illinois:		
French	527	.52
German	284	.69
Iowa State College	108	.31
Massachusetts Polytechnic Institute:		
French	99	.14
German	141	.31
Total	**1,465**	[1].52

High-school English and college commercial and vocational subjects

University of Detroit:		
Arts and sciences division	81	.54
Commerce and finance division	54	.34
Engineering division	164	.39
Total	**299**	[1].39

High-school English and college mathematics

University of Detroit:		
Arts and sciences division	147	.55
Commerce and finance division	79	.43
University of Illinois	230	.38
Iowa State College	277	.21
Total	**733**	[1].40

High-school English and college physical science

University of Detroit:		
Engineering division	73	.63
University of Illinois	246	.22
Iowa State College	423	.37
Total	**742**	[1].37

[1] Median.

TABLE 14.—*Correlation coefficients obtained between marks in high-school English and various groupings of college marks*—Continued

High-school English and college social studies

Institution	Number of cases	Coefficient
University of Detroit:		
Arts and sciences division	164	.41
Commerce and finance division	100	.49
Engineering division	44	.38
University of Illinois	511	.37
Iowa State College	268	.35
Massachusetts State College	192	.23
Rensselaer Polytechnic Institute	65	.38
Total	**1,344**	[1].38

[1] Median.

TABLE 15.—*Correlation coefficients obtained between marks in high-school social studies and various groupings of college marks*

High-school social studies and average first-year college marks

Institution	Number of cases	Coefficient
Iowa State College	432	.42
Massachusetts State College	230	.33
Rutgers University	190	.43
University of Tennessee	331	.29
Total	**1,283**	[1].37

High-school social studies and average college marks for all 4 years

Iowa State College	297	.34
Massachusetts State College	166	.40
University of Tennessee	124	.26
Washington University	609	.43
Total	**1,196**	[1].37

High-school social studies and college physical science

University of Detroit:		
Engineering division	72	.41
Iowa State College	44	.41
Massachusetts State College	244	.25
Total	**360**	[1].41

[1] Median.

TABLE 15.—*Correlation coefficients obtained between marks in high-school social studies and various groupings of college marks*—Continued

High-school social studies and college social studies

Institution	Number of cases	Coefficient
University of Detroit:		
Arts and sciences division	63	.43
Commerce and finance division	99	.51
Engineering division	43	.38
University of Illinois	481	.35
Iowa State College	265	.32
Massachusetts State College	191	.29
Rensselaer Polytechnic Institute	64	.38
Total	**1,206**	[1].38

High-school social studies and college commercial and vocational subjects

University of Detroit:		
Commerce and finance division	55	.44

High-school social studies and college foreign languages

University of Detroit:		
Arts and sciences division	64	.44
Commerce and finance division	82	.53
Iowa State College	105	.30
Massachusetts State College:		
French	98	.45
German	141	.26
Total	**490**	[1].44

High-school social studies and college biological science

Iowa State College	264	.34
Massachusetts State College	215	.30
Total	**479**	[1].32

High-school social studies and college English

Iowa State College	416	.36
Massachusetts State College	252	.46
Total	**668**	[1].41

[1] Median.

TABLE 15.—*Correlation coefficients obtained between marks in high-school social studies and various groupings of college marks*—Continued

High-school social studies and college economics

Institution	Number of cases	Coefficient
University of Illinois	323	.43
Iowa State College	301	.35
Massachusetts State College	199	.33
Total	**823**	[1].35

High-school social studies and college mathematics

University of Detroit:		
Commerce and finance division	79	.35
Iowa State College	274	.43
Massachusetts State College	230	.20
Total	**583**	[1].35

[1] Median.

TABLE 16.—*Correlation coefficients obtained between marks in high-school foreign languages and various groupings of college marks*

High-school foreign languages and average first-year college marks

Institution	Number of cases	Coefficient
Iowa State College	91	.40
Massachusetts State College	211	.37
Rutgers University	186	.47
University of Tennessee:		
French	381	.28
Latin	381	.30
Spanish	381	.28
Total	**1,631**	[1].33

High-school foreign languages and average college marks for all 4 years

Iowa State College	91	.30
Massachusetts State College	156	.31
University of Tennessee:		
French	124	.12
Latin	124	.57
Washington University	[2] 756	.47
Total	**1,251**	[1].31

[1] Median.
[2] See footnote 2 at end of table.

TABLE 16.—*Correlation coefficients obtained between marks in high-school foreign languages and various groupings of college marks*—Continued

High-school foreign languages and college biological science

Institution	Number of cases	Coefficient
University of Detroit:		
Arts and sciences division	168	.46
Iowa State College	811	.42
Massachusetts State College	198	.32
Total	**1,177**	**[1].42**

High-school foreign languages and college economics

Iowa State College	91	.30
Massachusetts State College	183	.29
Total	**274**	**[1].29**

High-school foreign languages and college English

University of Detroit:		
Arts and sciences division	219	.51
Commerce and finance division	58	.51
Iowa State College	135	.36
Massachusetts State College	231	.26
Total	**643**	**[1].43**

High-school foreign languages and college social studies

University of Detroit:		
Arts and sciences division	165	.45
Iowa State College	89	.30
Massachusetts State College	176	.22
Total	**430**	**[1].30**

High-school foreign languages and college mathematics

University of Detroit:		
Commerce and finance division	.79	.52
University of Illinois	512	.42
Iowa State College	90	.10
Massachusetts State College	212	.33
Total	**893**	**[1].37**

[1] Median.

TABLE 16.—*Correlation coefficients obtained between marks in high-school foreign languages and various groupings of college marks*—Continued

High-school foreign languages and college foreign languages

Institution	Number of cases	Coefficient
University of Detroit:		
Commerce and finance division	68	.40
University of Illinois:		
French	341	.57
German	279	.49
Iowa State College	281	.46
Massachusetts State College:		
French	91	.23
German	133	.39
Total	**1,193**	[1].43

High-school foreign languages and college physical science

University of Detroit:		
Arts and sciences division	125	.58
Engineering division	73	.42
Iowa State College	135	.28
Massachusetts State College	223	.28
Total	**556**	[1].35

[1] Median.
[2] This was made up in the original data as follows:

	Number of cases	Coefficient
Ancient languages	406	.47
Modern languages	350	.47
Total	**756**	[1].47

TABLE 17.—*Correlation coefficients obtained between marks in high-school science and various groupings of college marks*

High-school science and average first-year college marks

Institution	Number of cases	Coefficient
Iowa State College	419	.42
Massachusetts State College	225	.31
Rutgers University	191	.44
University of Tennessee	381	.58
Total	**1,216**	[1].43

[1] Median.

TABLE 17.—*Correlation coefficients obtained between marks in high-school science and various groupings of college marks*—Continued

High-school science and average college marks for all 4 years

Institution	Number of cases	Coefficient
Iowa State College	289	.37
Massachusetts State College	157	.29
University of Tennessee	124	.30
Washington University	593	.43
Total	**1,163**	**[1].33**
High-school science and college biological science		
University of Detroit:		
Arts and sciences division	163	.60
University of Illinois	459	.55
Iowa State College	254	.43
Massachusetts State College	207	.30
Total	**1,083**	**[1].49**
High-school science and college economics		
Iowa State College	293	.34
Massachusetts State College	190	.14
Total	**483**	**[1].24**
High-school science and college English		
University of Detroit:		
Arts and sciences division	212	.31
University of Illinois	812	.44
Iowa State College	412	.32
Massachusetts State College	236	.22
Total	**1,672**	**[1].31**
High-school science and college social studies		
University of Detroit:		
Arts and sciences division	160	.22
Iowa State College	257	.40
Massachusetts State College	184	.10
Total	**601**	**[1].22**

[1] Median.

TABLE 17.—*Correlation coefficients obtained between marks in high-school science and various groupings of college marks*—Continued

High-school science and college mathematics

Institution	Number of cases	Coefficient
University of Detroit:		
Arts and sciences division	145	.36
Iowa State College	264	.29
Massachusetts State College	180	.47
Total	**589**	**[1].36**

High-school science and college foreign languages

University of Detroit:		
Commerce and finance division	65	.33
Iowa State College	97	.32
Massachusetts State College:		
French	92	.28
German	136	.14
Total	**390**	**[1].30**

High-school science and college physical science

University of Detroit:		
Engineering	72	.50
University of Illinois	497	.46
Iowa State College	410	.40
Massachusetts State College	232	.34
Rensselaer Polytechnic Institute	402	.40
Total	**1,613**	**[1].40**

High-school science and college commercial and vocational subjects

University of Detroit:		
Arts and sciences division	81	.48
Engineering division	74	.18
Total	**155**	**[1].33**

[1] Median.

TABLE 18.—*Correlation coefficients obtained between marks in high-school mathematics and various groupings of college marks*

High-school mathematics and average first-year college marks

Institution	Number of cases	Coefficient
Iowa State College	435	.52
Massachusetts State College	228	.35
Rensselaer Polytechnic Institute	389	.47
Rutgers University	195	.42
University of Tennessee	381	.37
Total	**1,628**	**[1].42**

High-school mathematics and average college marks for all 4 years

Iowa State College	300	.30
Massachusetts State College	168	.31
Rensselaer Polytechnic Institute	215	.38
University of Tennessee	124	.49
Washington University	603	.41
Total	**1,410**	**[1].38**

High-school mathematics and college biological science

University of Illinois	459	.55
Iowa State College	266	.45
Massachusetts State College	218	.35
Total	**943**	**[1].45**

High-school mathematics and college mathematics

University of Detroit:		
Arts and sciences division	106	.40
Commerce and finance division	101	.48
Engineering division	166	.32
Iowa State College	277	.46
Massachusetts State College	230	.40
Rensselaer Polytechnic Institute	413	.47
Total	**1,293**	**[1].43**

High-school mathematics and college English

University of Detroit:		
Arts and sciences division	115	.79
Commerce and finance division	100	.39
Engineering division	165	.75
University of Illinois	812	.44
Iowa State College	427	.45
Massachusetts State College	253	.35
Total	**1,872**	**[1].44**

[1] Median.

TABLE 18.—*Correlation coefficients obtained between marks in high-school mathematics and various groupings of college marks*—Continued

High-school mathematics and college social studies

Institution	Number of cases	Coefficient
University of Detroit:		
Arts and sciences division	165	.45
Commerce and finance division	97	.15
Engineering division	44	.38
Iowa State College	268	.29
Massachusetts State College	192	.07
Total	**766**	**[1].29**

High-school mathematics and college commercial and vocational subjects

University of Detroit:		
Commerce and finance division	54	.66
Engineering division	165	.49
Total	**219**	**[1].57**

High-school mathematics and college foreign languages

University of Detroit:		
Arts and sciences division	213	.45
Commerce and finance division	92	.41
Iowa State College	108	.31
Massachusetts State College:		
French	99	.12
German	142	.29
Total	**654**	**[1].31**

High-school mathematics and college economics

Iowa State College	303	.36
Massachusetts State College	200	.24
Total	**503**	**[1].30**

High-school mathematics and college physical science

University of Detroit:		
Arts and sciences division	122	.51
Engineering division	73	.47
University of Illinois	497	.46
Iowa State College	423	.44
Massachusetts State College	245	.31
Total	**1,360**	**[1].46**

[1] Median.

TABLE 19.—*Correlation coefficients obtained between marks in high-school art and music and various groupings of college marks*

High-school art and music and average first-year college marks

Institution	Number of cases	Coefficient
Massachusetts State College	62	.22
University of Tennessee	381	[1].15
Total	**443**	[2].18
High-school art and music and average college marks for all 4 years		
Massachusetts State College	47	.27
High-school art and music and college biological science		
Massachusetts State College	56	.27
High-school art and music and college physical science		
Massachusetts State College	66	.25
High-school art and music and college mathematics		
Massachusetts State College	60	.15
High-school art and music and college English		
Massachusetts State College	69	.15
High-school art and music and college social studies		
Massachusetts State College	54	.16
High-school art and music and college economics		
Massachusetts State College	55	.05
High-school art and music and college foreign languages		
Massachusetts State College:		
French	27	.07
German	38	.30
Total	**65**	[2].18

[1] Art only. [2] Median.

TABLE 20.—*Correlation coefficients obtained between marks in high-school vocational subjects and various groupings of college marks*

High-school vocational subjects and average college freshman marks

Institution	Number of cases	Coefficient
Iowa State College	34[illegible]	.29
Massachusetts State College	[illegible]2	.11
University of Tennessee	381	.18
Total	**800**	**[1].18**

High-school vocational subjects and average college marks for 4 years

Iowa State College	233	.28
Massachusetts State College	49	.13
University of Tennessee	124	−.06
Total	**406**	**[1].13**

High-school vocational subjects and college English

Iowa State College	322	[illegible]
Massachusetts State College	[illegible]8	[illegible]05
Total	**400**	**[1].14**

High-school vocational subjects and college social studies

Iowa State College	210	.10
Massachusetts State College	5[illegible]	.01
Total	**267**	**[1].05**

High-school vocational subjects and college foreign languages

Iowa State College	[illegible]4	.13
Massachusetts State College:		
French	2[illegible]	−.19
German	3[illegible]	.05
Total	**138**	**[1].05**

High-school vocational subjects and college economics

Iowa State College	246	.10
Massachusetts State College	58	.04
Total	**304**	**[1].07**

[1] Median.

TABLE 20.—*Correlation coefficients obtained between marks in high-school vocational subjects and various groupings of college marks*—Continued

High-school vocational subjects and college biological science

Institution	Number of cases	Coefficient
Iowa State College	218	.46
Massachusetts State College	66	.31
Total	**284**	**[1].38**

High-school vocational subjects and college physical science

Iowa State College	339	.26
Massachusetts State College	77	—.09
Total	**416**	**[1].08**

High-school vocational subjects and college mathematics

Iowa State College	217	.27
Massachusetts State College	67	.05
Total	**284**	**[1].16**

[1] Median.

TABLE 21.—*Correlation coefficients obtained between marks in high-school commercial subjects and various groups of college marks*

High-school commercial subjects and average college freshman marks

Institution	Number of cases	Coefficient
Iowa State College	311	.45
Massachusetts State College	38	.28
University of Tennessee	381	.36
Total	**730**	**[1].36**

[1]Median.

TABLE 21.—*Correlation coefficients obtained between marks in high-school commercial subjects and various groups of college marks*—Continued

High-school commercial subjects and average college marks for 4 years

Institution	Number of cases	Coefficient
Iowa State College	208	.36
Massachusetts State College	28	.19
Total	**236**	**[1].27**
High-school commercial subjects and college English		
Iowa State College	278	.39
Massachusetts State College	42	.25
Total	**320**	**[1].32**
High-school commercial subjects and college social studies		
Iowa State College	192	.20
Massachusetts State College	30	.43
Total	**222**	**[1].31**
High-school commercial subjects and college foreign languages		
Iowa State College	73	.38
High-school commercial subjects and college economics		
Iowa State College	212	.17
Massachusetts State College	32	−.10
Total	**244**	**[1].03**
High-school commercial subjects and college biological science		
Iowa State College	201	.35
Massachusetts State College	35	.18
Total	**236**	**[1].26**
High-school commercial subjects and college physical sicence		
Iowa State College	300	.30
Massachusetts State College	38	.32
Total	**238**	**[1].31**

[1] Median.

TABLE 22.—*Summary of correlation coefficients*[1] *between marks in high-school subject groups and college subject groups*

High-school subject group	Average of 4 years of college marks	College subject groups						
		Biological science	Physical science	Mathematics	English	Social studies	Economics	Foreign language
1	2	3	4	5	6	7	8	9
Art and music	.27	.27	.25	.15	.15	.16	.05	.18
Social studies	.37	.32	.41	.35	.41	.38	.35	.44
Foreign languages	.31	.42	.35	.37	.43	.30	.29	.43
English	.42	.42	.37	.40	.46	.38	.32	.52
Commercial subjects	.27	.26	.31	.....	.32	.31	.03	.38
Vocational subjects	.13	.38	.08	.16	.14	.05	.07	.05
Science	.33	.49	.40	.36	.31	.22	.24	.30
Mathematics	.38	.45	.46	.43	.44	.29	.30	.31

[1] In most cases the coefficients are medians and are subject to the limitations of such coefficients. The reason for choosing the median is explained in the text.

TABLE 23.—*Median correlation coefficients of table 22 corrected for attenuation*

High-school subject group	Average of 4 years of college marks	College subject groups						
		Biological science	Physical science	Mathematics	English	Social studies	Economics	Foreign language
1	2	3	4	5	6	7	8	9
Art and music	.45	.45	.42	.25	.25	.27	.08	.30
Social studies	.62	.53	.68	.58	.68	.63	.58	.73
Foreign languages	.52	.70	.58	.62	.72	.50	.48	.72
English	.70	.70	.62	.67	.77	.63	.53	.87
Commercial subjects	.45	.43	.52	.....	.53	.52	.05	.63
Vocational subjects	.22	.63	.13	.27	.23	.08	.12	.08
Science	.55	.82	.67	.60	.52	.37	.40	.50
Mathematics	.63	.75	.77	.72	.73	.48	.50	.52

These results show that marks in high-school art and music are not closely related to those in any college subject. Marks in social studies are rather indiscriminately related to those in all subjects—the correlation ranging from not less than .32 to not more than .44—and are not more prognostic of success in social studies in college than in other subjects. Marks in high-school foreign languages are somewhat more related to those in

college foreign languages (.43), English (.43), and biological science (.42), than to those in physical science, mathematics, social studies, and economics. The relationship between marks in high-school foreign languages and college marks in foreign languages and English can be understood, but the relationship with biological science is not so obvious unless it is due to the fact that in both subjects memory for detail is important. High-school English marks are most closely related to college English (0.46) and foreign language marks (.52). Marks in high-school commercial subjects are uniformly low in relation to college scholarship in different subjects and particularly low in relation to college marks in economics. Apparently there is little relation between the grade of work done in high-school typewriting, shorthand, bookkeeping, and other business courses and success in college economics courses. The correlation coefficients between marks in high-school vocational subjects and college subjects approach zero in all cases except one. The one exception is the coefficient for biological science.

High-school science marks correlate highest with science marks in college (.49 and .40), somewhat less with the related subject mathematics (.36), and rather poorly with other college subjects. High-school mathematics marks do not discriminate between success in college science, mathematics, and English, but are distinctly less related to college social studies, economics, and foreign languages.

Some previous investigators have found differences in the value of marks in specific high-school subjects to predict general or average college scholarship. Garnett,[10] for example, found that English and mathematics yielded higher correlations than other subjects. This is in accordance with our results. On the other hand, most of the previous studies[11] of the value of work in different high-school subjects have indicated that the particular group of subjects taken in high school has neither any value as a prerequisite to college education nor in a prognostic capacity. In most cases these conclusions have been arrived at simply from a study of the groups of subjects taken in high school and not from the marks made in the different high-school subjects. It is believed that the reason that no differential association was found is because the use of groups of high-school subjects is too coarse a measure of the predictive value of the different subjects. In working with patterns of high-school subjects it is almost impossible to

[10] Garnett, H. L. Predictive value of high-school records with special reference to rank in class. Doctor's thesis, Stanford university, 1933.

[11] Gowen, J. W. *and* Gooch, M. The mental attainments of college students in relation to previous training Journal of educational psychology, 16: 547–68, November 1925.

Yates, J. A. The type of high-school curriculum which gives the best preparation for college. Bulletin of the Bureau of school service, University of Kentucky, vol. A, no. 1, 1929.

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cancel out the effect of all the high-school subjects but the one, or the group of subjects under investigation. Moreover, Gowen and Gooch not only investigated patterns of high-school subjects but also correlated success in high-school subjects with success in college subjects. Subjects in their study meant individual subjects such as algebra, geometry, chemistry, etc., in high school, and chemistry, algebra, analytical geometry, elementary French, etc., in college. Also no vocational, commercial, or art and music courses were considered. In other words, it covered a more restricted area of study than the present investigation, which includes whole subject groups in high-school and college such as mathematics, science, etc., and is not restricted to the "academic" subjects of the curriculum.

The correlations Gowen and Gooch found agree fairly well with the results obtained in this study insofar as the results can be compared. For example, marks in high-school English correlated as follows with marks in certain college subjects:

College subject	Correlation coefficient	Number of cases	College subject	Correlation coefficient	Number of cases
English	.28	563	Analytical geometry	.27	342
Chemistry	.21	471	Advanced French	.39	129
Algebra	.23	361	German	.19	240

High-school English correlates highest with college English, analytical geometry, and French. The correlation of English with French can be attributed to a common factor, while the correlation with analytical geometry cannot easily be so attributed. The other correlations are in line with expectations. Similarly, high-school chemistry is found to be more closely related to mathematics than to foreign languages; high-school algebra is found to be more closely related to mathematics than to English, chemistry, foreign languages, et cetera.

The relationships which could not be so easily explained by the psychological theory of similar factors were emphasized by Gowen and Gooch. They emphasized, for example, the lack of significant correlation (.20) found between rank in high-school chemistry and marks in college chemistry, while the relationships of the rank in high-school chemistry with most other college subjects were higher. Discrepancies of this kind can be attributed to the fact that they represent subjects in which various selective influences were at work. For example, only a few students taking high-school chemistry also take college chemistry. The few who take college chemistry may be so outstanding a group that their high-school marks are all high. In

their case the correlation between the high-school marks and marks made in college chemistry would be close to zero. These variations can account for the several exceptions occurring in Gowen and Gooch's data. In the data of the present report, which involve subject groups rather than individual subjects, the relationships are not nearly so capricious.

Gowen and Gooch's study of subject patterns, together with their correlational data just described, led them to the conclusion that it made little difference for success in college what subjects were taken in high school.

On the other hand, the conclusion of the present study is that success or nonsuccess in different high-school subjects does have a differential association with success in college subject groups. For example, the fact that high-school marks in science correlate measurably well with science marks in college but correlate definitely lower with college English, social studies, economics, and foreign languages is taken to mean that high-school science marks may be used (within limitations) by counselors in advising with students concerning their college courses. This conclusion is important, since it is contrary to the conclusions of previous research. It should be pointed out that the conclusion reached is one concerned with the guidance of students. A predictive relationship does not prove a causal relationship. The conclusion that differences in success in high-school subjects indicate differences in success in different college subjects does not prove that the good work in high-school subjects is the cause of good work in college. There may be an inherited mental trait which causes success in both cases. Causation is possible, but only predictive value is here claimed.

Sex differences.—Washington University calculated its correlation coefficients between the average high-school marks as a whole and for each subject with the average mark in college for each sex separately, as well as for all students (table 24). All correlation coefficients are greater for women than for men except in mathematics, where the difference is slightly in favor of the men. These results are consistent with the little work that has been done in this area. White[12] found the correlation between Terman Group Intelligence scores and average marks for 112 high-school girls to be .59 and for 102 boys .33. For 91 girls taking English a correlation of .64 was found, whereas for 62 boys taking English the correlation was .59.

These figures show that women are more constant in their attack on high-school and college work. The factor of performance can therefore be used with somewhat more confidence in the guidance of women students than of men.

[12] White, B. F. The correlation and comparison of teachers' marks and scores made in the Terman Group Intelligence Test. Journal of educational research, 12: 78–81, June 1925.

TABLE 24.—*Correlation coefficients between marks in various high-school subject groupings and average marks in college by sex*

[From Washington University]

Subject grouping	Women		Men		Total	
	Number of cases	Coefficient	Number of cases	Coefficient	Number of cases	Coefficient
1	2	3	4	5	6	7
General average	238	.62	373	.47	611	.54
Social science	237	.51	372	.35	609	.43
Ancient languages	173	.54	233	.40	406	.47
Modern languages	177	.50	173	.39	350	.47
English	236	.48	372	.44	608	.47
Mathematics	237	.39	366	.41	603	.41
Physical science	232	.48	361	.39	593	.43

APTITUDE AND ACHIEVEMENT TEST RESULTS

Data on the relationship between general scholastic aptitude (intelligence) tests and scholarship in college show that there is a substantial relationship between the results of such tests and scholarship, and that therefore they may be used in guidance to advantage (table 25). The correlations between the test results and success in different college subjects indicate that there is a differential relationship existing between intelligence test results and attainment in different college subjects (table 26). There is considerably less relationship between scholarship aptitude test results and marks in art and music (coefficient of .13), economics (coefficient of .24), and social studies (coefficient of .32) than between such test results and English (coefficient of .48), foreign languages (coefficient of .43), and physical and biological science (coefficients of .43).

Special aptitude and achievement test results correlate to about the same extent with college scholarship as do general aptitude test results (table 27). This is an important point, since some high schools are faced with the problem of using either a general aptitude (intelligence) test or a general achievement test. Since a general achievement test can be used diagnostically as well as for prognostic purposes, this is the test to be used. Of course, as aptitude tests are developed which test different mental traits fairly accurately so that a differential prognosis can be made, the advantage of the general achievement test disappears.

TABLE 25.—*Correlation coefficients obtained between general scholastic aptitude test results and marks in various college subject groups*

General scholastic aptitude and average college freshman marks

Institution	Name of test	Number of cases	Coefficient
University of Louisville	American Council Psychological Examination.	292	.60
	Kentucky Classification	282	.56
Marquette University:			
Business administration division.	American Council Psychological Examination.	111	.49
Engineering division	do	132	[1].53
Journalism division	do	72	[1].53
Liberal-arts division	do	375	[1].53
Business-administration division.	Henmon-Nelson	94	[1].36
Engineering division	do	103	[1].46
Journalism division	do	49	[1].39
Liberal-arts division	do	308	[1].29
Massachusetts State College	[2]	241	.34
Rutgers University	Thorndike	174	.42
Total		**2,233**	**[3].47**

General scholastic aptitude and average college marks for 4 years

Massachusetts State College	[2]	172	.39
Syracuse University	American Council Psychological Examination.	1,052	.43
Washington University	[4]	287	.38
Total		**1,511**	**[3].39**

General scholastic aptitude and college art and music

Massachusetts State College	[2]	46	.13

General scholastic aptitude and college biological science

University of Louisville	American Council Psychological Examination.	176	[1].53
Massachusetts State College	[2]	225	.33
Total		**401**	**[3].43**

[1] First semester only.
[2] A combination of three tests—the Army Alpha, American Council Psychological Examination, and a locally constructed one.
[3] Median.
[4] Miscellaneous intelligence tests used in high schools.

TABLE 25.—*Correlation coefficients obtained between general scholastic aptitude test results and marks in various college subject groups*—Continued

General scholastic aptitude and college physical science

Institution	Name of test	Number of cases	Coefficient
University of Louisville	American Council Psychological Examination.	209	[1].53
Massachusetts State College	[2]	253	.31
Total		**462**	[3].43

General scholastic aptitude and college English

University of Louisville	American Council Psychological Examination.	235	[1].55
Massachusetts State College	[2]	265	.41
Total		**500**	[3].48

General scholastic aptitude and college social studies

University of Louisville	American Council Psychological Examination.	153	[1].45
Massachusetts State College	[2]	199	.19
Total		**352**	[3].32

General scholastic aptitude and college economics

Massachusetts State College	[2]	206	.24

General scholastic aptitude and college foreign languages

University of Louisville	American Council Psychological Examination.	189	[1].57
Massachusetts State College	[2]	252	[5].29
Total		**441**	[3].43

[1] First semester only.
[2] A combination of three tests—the Army Alpha, American Council Psychological Examinations, and a locally constructed one.
[3] Median.
[5] This correlation coefficient is made up from two correlation coefficients as follows:

Name of test	Number of cases	Coefficient
[4]	105 in French	.29
	147 in German	.30
Total	252	[3].29

[3] Median.
[4] See text footnote 2, above.

TABLE 26.—*Summary of correlation coefficients between general scholastic aptitude test results and marks made in different college subjects*

College subject	Coefficient [1]	College subject	Coefficient [1]
Art and music	.13	Foreign languages	.43
Biological science	.43	Physical science	.43
Economics	.24	Social studies	.32
English	.48		

[1] These are in all cases except 1 a median coefficient.

TABLE 27.—*Correlation coefficients between special aptitude or achievement tests and average college marks*

Special aptitude or achievement and freshman marks

Institution	Name of test	Number of cases	Coefficient
University of Louisville	Iowa language aptitude	208	.58
	Nelson-Denny Reading	208	.55
	Sones-Harry High School Achievement.	106	.37
Marquette University:			
Business Administration division	Iowa Content Examination	111	[1].48
Engineering division	do	132	[1].47
Journalism division	do	72	[1].44
Liberal Arts division	do	375	[1].48
Rutgers University	Pribble-McCrory Diagnostic Test in Practical English Grammar.	189	.45
	Columbia Research Bureau English.	187	.34
Total		**1,588**	[2].47

Special aptitude or achievement and average college marks for all 4 years

Syracuse University	New York State Regents Examination.	871	.57

[1] First semester only. [2] Median.

Relation of scholastic aptitude to the student's decision concerning his future occupation or college attendance.—The relation between scholastic aptitude and the decision to enter a certain occupation has escaped the attention of most workers in this area. At the University of Hawaii the high-school graduating seniors were asked as to their certainty of choice of occupation. Replies show that half the students had made a decision as to their future occupa-

tions and that these pupils ranked 10 points higher on the scholastic aptitude examination than the other students (table 28). This difference is significant. The students were also asked whether they (*a*) expected to attend college, (*b*) were undecided as to attending college, or (*c*) had decided not to attend college. These replies show very large differences in scholastic aptitude between the students answering in the three different ways (table 29). Apparently these students had quite a definite feeling regarding their college careers which was in keeping with their abilities along this line. Probably the decision to enter a certain vocation or attend college can therefore be counted by the counselor as one important indication of the vocational fitness of the pupil. In other words, students themselves know considerable about their own limitations and possibilities—and this source of information should always be tapped if the student is being interviewed. Interest is a factor in this situation, since what students like to do is also something in which they are likely to be proficient.

TABLE 28.—*Distribution of total scores on the American Council Psychological Examination for students grouped according to definiteness of occupational choice*

Scores	A definite choice	No definite choice
295 to 309	1	3
280 to 294	7	1
265 to 279	5	5
250 to 264	8	7
235 to 249	11	11
220 to 234	25	21
205 to 219	39	25
190 to 204	47	25
175 to 189	65	43
160 to 174	92	66
145 to 159	108	74
130 to 144	121	82
115 to 129	121	115
100 to 114	141	127
85 to 99	141	134
70 to 84	129	129
55 to 69	77	121
40 to 54	50	48
25 to 39	7	14
10 to 24	2	4
Total	1,197	1,058
Average (mean) score	127.4	117.3

TABLE 29.—*Distribution of total scores on the American Council Psychological Examination by college expectation*

[Adapted from the University of Hawaii]

Scores	College chosen	Undecided as to which college	Not going to college	Total
1	2	3	4	5
295 to 309	2	2		4
280 to 294	7	1		8
265 to 279	9		1	10
250 to 264	14	1		15
235 to 249	16	2	4	22
220 to 234	34	4	8	46
205 to 219	41	4	19	64
190 to 204	53	4	15	72
175 to 189	62	7	39	108
160 to 174	78	10	70	158
145 to 159	76	12	94	186
130 to 144	82	20	101	203
115 to 129	70	12	154	236
100 to 114	64	15	189	270
85 to 99	53	16	206	275
70 to 84	47	9	202	258
55 to 69	15	5	178	198
40 to 54	5	1	92	98
25 to 39	2		22	24
10 to 24			6	6
Total	730	125	1,400	2,255
Average (mean) score	153.4	134.5	105.2	122.8

Occupation of father.—Although knowledge of the occupation of the father of a student cannot be used in a democratic society as an index for admission to college, it may be used in guidance. The occupation of a father is related to income of the family, the cultural status of the home, and the scholastic aptitude of the student. The University of Hawaii has presented the data in table 30 to show the scores of students on the American Council on Education Psychological Examination in relation to the occupations of their fathers. There is considerable overlapping of the different distributions, but the large difference in means shows that there is an important differentiating factor present. These data should not be interpreted to mean that the occupation of the father is the cause of a low or a high psychological score. Both conditions are caused by some deeper selective factors. However, the occupation of the father can be used as a symptom, or as a signal to consider other possibilities.

TABLE 30.—*Distribution of scores on the American Council Psychological Examination by father's occupation*

[From the University of Hawaii]

Scores	Professional	Business executives and foremen	Clerical workers	Salesmen	Skilled laborers	Unskilled laborers	Farmers	Total
1	2	3	4	5	6	7	8	9
295 to 309	2	1	.....	.....	.....	.....	.....	3
280 to 294	3	1	2	1	.....	.....	.....	7
265 to 279	6	1	.....	.....	1	1	.....	9
250 to 264	7	4	2	.....	1	.....	.....	14
235 to 249	6	4	6	2	2	1	.....	21
220 to 234	5	9	13	6	2	2	1	38
205 to 219	14	7	6	16	4	4	4	55
190 to 204	6	9	5	12	14	8	2	56
175 to 189	11	16	9	16	14	16	3	85
160 to 174	16	13	9	22	34	22	6	122
145 to 159	12	18	9	33	29	39	10	150
130 to 144	14	5	17	39	40	34	7	156
115 to 129	11	12	15	37	52	42	7	176
100 to 114	12	10	20	36	61	58	11	208
85 to 99	8	6	12	46	66	64	16	218
70 to 84	8	7	12	39	52	58	13	189
55 to 69	9	3	6	22	47	44	11	142
40 to 54	2	1	2	13	24	27	4	73
25 to 39	1	.....	.....	2	6	5	3	17
10 to 24	.....	.....	.....	1	1	1	.....	3
Total	153	127	145	343	450	426	98	1,742
Average (mean) score	162.0	162.1	145.6	124.4	112.5	109.5	112.4	130.8

SUMMARY AND IMPLICATIONS

Seven factors concerned in the adjustment of entering college students have been studied. Some of these factors are concerned with desirable changes in college life which will indirectly make a better adjustment between the individual's potentialities and his college activities, while other factors are concerned more directly with personnel procedures with individual students.

Research in the college personnel field, in order to be called practical, must result in the improvement of the curricular or extracurricular offerings of the school and in the analysis of the individual student so that the program of the school can be adjusted to him. The improvement of the

various aspects of college life, whether it be in organization of the sequences of activities or in the content offered in such activities, has as its objective always the greater personal development of the individual. Some of the research reported herein has a bearing on the problem of the improvement of the college program. Practically all of it bears on the question of the analysis of the individual so that the adjustment of college life can be made in relation to individual students.

BEARING ON THE RESEARCH RESULTS ON THE COLLEGE PROGRAM

Articulation of high-school and college subject areas.—The articulation of high-school and college subject areas is probably one of the most important problems of college subject organization today. Results reported here show that students may begin specialization too soon. This is shown by the fact that students were found to choose college majors largely on the basis of specialized subject groups which they were required to take in high school. This would indicate that a reorientation of the student should occur when he enters college, through one or more general courses especially for those who do not have a definite vocational aim. It should be all the more necessary for those who are attending college for the sake of general culture to have some understanding of a large number of fields of human activity so that later a more intelligent choice of a specialty can be made. In the case of preparation for vocational life the important thing is to decide upon the right vocation. The educational program satisfying the vocational choice will follow more or less necessarily. But when the student is bound only by his own interests it becomes most important to give him a wide range of subject matter in order that he may discover what are his real interests before making a choice, since in this way it is possible to make the closest approximation of our ideal in guidance—an educational program to fit perfectly the pupil's greatest interests, abilities, and aptitudes.

The overlapping of subject matter found in high school and college causes waste and a deadening of the interest of those students forced to repeat work. Here again the college should either rearrange its courses to fit the incoming student or use placement examinations. The courses may be made to fit entering students either by dovetailing the college courses with the high-school courses, or by setting up a few broad, comprehensive courses in college which challenge the interest and ability of the student. The University of Chicago is an example of the latter procedure. At that institution students select two of the following broad fields of work on which to concentrate: The humanities, the social sciences, the physical sciences and the biological sciences. There is no real overlapping problem in this case, since the student is not forced to go over any specific detailed area as that represented by a high-school course.

The placement of college students in those courses for which they are best fitted, regardless of the sequence of the course in the curriculum, is a method which may be used without much experimentation and may be recommended for immediate attention. In using this procedure it will be necessary to make some changes in the credit systems of colleges. This is one of the main obstacles in the way of correct placement of students.

Extracurricular activities.—In advancing from high school to college, changes in the amount of participation in extracurricular activities seem to be common. Some of these changes, especially that from participation in extracurricular activities in high school to nonparticipation in such activities in college, seem to be accompanied by changes for the worse in the scholastic standing of the student. The data do not indicate whether or not the change in participation is a symptom or a cause. There is need apparently for a careful consideration of this phase of the life of the student upon entrance to college. Some students have been too active in athletics and social affairs in high school and need to have this part of their program brought within limits. However, to have participation cut off entirely at entrance to college should ordinarily be looked upon as undesirable since it disrupts the normal life of the individual. Change toward less participation in extracurricular activities at entrance to college may be due to the seeming lack of opportunity in a large university. If this is true, it means that better planning of this phase of the college students' activities should be encouraged. Social guidance is mostly left to chance. As a result, in large universities there are many students without adequate social outlets. Extracurricular activities seem to have a salutory effect on scholarship for most students. Nevertheless many students pay far too much attention to this phase of college life.

Extracurricular activities are useful not only in creating for the student a normal life while attending school, through furnishing proper bodily, social, and spiritual exercise and providing opportunities to develop normal social relationships, but also in creating interest in activities which can be carried on after leaving college. Therefore, in encouraging students in such activities or in setting up extracurricular programs, one of the questions which should always be asked is: Can this activity be carried on after leaving college? This can be illustrated best for physical activities. For example, handball, tennis, golf, and hiking can be continued after leaving college, while football and track can usually only be continued in a professional capacity.

Not only should opportunities of the right sort in sports and social activities be made a part of the college program, but individual guidance should be provided. The boy or girl who is delicate should be encouraged to seek some physical activity but it should not be one of the strenuous types. The husky but sedentarily inclined boy should be encouraged, if there is nothing

organically wrong, to take up an activity such as tennis or handball. Intellectual activities should be encouraged in conformity with the interests of the student.

BEARING OF THE RESEARCH RESULTS ON THE ADJUSTMENT OF INDIVIDUAL STUDENTS

General considerations.—Implications for improving the college programs have been drawn from the results of the study of two factors, articulation of high-school and college subject areas and extracurricular activities. The other five factors have a bearing upon the adjustment of individual students. No one of these taken by itself presents a measure which can be used with unerring accuracy in guiding an individual. Taken together, however, they may often form a pattern which will indicate fairly well the possibilities of a student's success or failure in college or in different subjects in a college.

In the early days of intelligence testing it was hoped that an examination instrument would soon be devised which would predict rather accurately at the end of high school the success which would attend the student in college. This particular hope has not been realized. No single instrument predicts success accurately. It is true that more recently constructed intelligence tests and high-school achievement tests do predict college success much better than the early ones, but the idea of one superinstrument for this level has of late been generally given up. On the lower levels of schooling instruments are much more accurate. Either achievement or intelligence tests on the elementary school level give a fair prognosis of high-school success. There are at least two possible reasons for this difference in the prognostic power of tests at different levels. One is that there is more selection of pupils at the higher levels. The level of accomplishment is a narrow one. The difference, for instance, between the ability of a good and a poor mathematics student in college is less than the difference between a good and a poor pupil in arithmetic in elementary school. The first difference may be compared to a difference in I. Q. of 105 and 130, whereas the second difference may be compared with a difference in I. Q. of 85 and 125. The other reason for poorer prognosis on the college level arises from the multiplicity of types of studies in which success can be attained. In the elementary school an intelligence examination can be devised which is closely allied to the entire content of the school curriculum. On the college level the more varied content of the curriculum makes the construction of a general prognostic test more difficult.

Therefore, in the guidance of college students it is becoming more and more the practice to depend upon a large number of factors concerning the individual student. The whole pattern of these factors is considered rather than any one factor. The interpretation of a pattern of factors may

be to a large extent a matter of judgment. One factor must be balanced against another. Research has not gone far enough to describe the meaning of very many complicated individual patterns. With our present knowledge of the interaction of factors, the use of a large number of elements is taken to be the best background for guidance. If these factors are expressed in a time series or a growth curve, the resulting record is of even greater guidance value. For example, if test results are available in mathematics beginning with the sixth grade and running through the twelfth grade, this series of scores will indicate more accurately the mathematical ability (and therefore also mathematical aptitude) of the student than a single score on a mathematics test. That guidance based on several factors is more accurate than when it is based on one factor can, of course, be proved by the multiple correlation method. This method is described and many examples given in a previous bulletin [13] of this Office.

As a part of the present investigation Marquette University studied not only the value of individual factors or predictive items, but their value in combination. It should be noted that in this sort of combination scores are reweighted in accordance with their respective contributions to the relationship. At Marquette the multiple correlation was computed on the basis of the scores on the Iowa Content Examination, the American Council Psychological Examination, and rank in high school. The highest zero order coefficient was .57, while the multiple correlation is .66—an increase of 9 points, which is substantial. All factors concerning the student are not susceptible of such mathematical treatment, and one cannot therefore make any estimate of the accuracy of guidance based on seven items such as those reported upon in this cooperative study. Their value, however, in comparison to no guidance, or to guidance based on inadequate techniques, is indeed great. For example, guidance based on only three items used in the Marquette study shows a degree of efficiency in prediction of 25 percent, which is large compared to the traditional methods judged by Patterson [14] to have a predictive value of 3 or 4 percent. Patterson did not cite any specific study as a basis for this statement, but there is evidence from other quarters showing that he is correct in his judgment. Consider, for example, the requirements for college entrance. A traditional method is to require only that entering students have a minimum number of high-school units of credit in certain subjects. What is the efficiency of this method in picking out college students? Douglass [15] in his study of 387 students of the class of 1930 at the University of Oregon, obtained correlation coefficients between the number of units earned in different high-

[13] Segel, David. Prediction of success in college. Washington, United States Department of the Interior, Office of Education. Bulletin, 1934, No. 15.

[14] In Introduction to Williamson, E. G. *and* Darley, J. G. Student personnel work. New York, McGraw-Hill Book co., 1937.

[15] Douglass, Harl R. Selecting college entrants. Journal of higher education, 3: 179–84, April 1932.

school subjects and average college marks ranging from —.04 for social studies to .17 for foreign languages. The percent of efficiency in the selection of students with this method would therefore not be over 1½ percent. Patterson's estimate of 3 or 4 percent therefore can be considered as overestimating rather than underestimating the efficiency of calculating the probable success of candidates for college entrance on the basis of the so-called traditional methods.

Delayed admission.—Students who are delayed a few years in entering college make somewhat better marks in college than those who enter immediately after high-school graduation. Delay in entering college should not create a prejudice against a student who applies for admission. New regulations which colleges or universities impose on high schools should never be made retroactive in any way, since it may tend to exclude students who graduated under the old requirements and have delayed their entrance to the university. In counseling students of this type one may count their earnestness in work as a predisposing factor for success. The difficulty with such students will lie mainly in their having forgotten how to study. Once they get into the swing of things, little further difficulty on that score should be experienced. In a few cases such students may become too active in extracurricular activities. With these points in mind, the knowledge that a person has delayed entrance to college should be of value in arranging a college program and counseling the student regarding his activities and the distribution of his study time and his methods of study.

Age.—The age at entrance to college correlates negatively with success in college. The fact that a student is older than the average at entrance to college may be attributed to one of two conditions. Either he was delayed in his entrance to college—discussed above—or he was older than the average when he graduated from high school. Since delayed admission has been shown to be positively associated with college success, it follows that the cause of the negative correlation of age with success in college lies in the group of students who graduate from high school at an age above the average. The reason for this condition lies in the lower general scholastic (mental) ability of these pupils.

The seeming discrepancy between the findings in regard to age at entrance and delayed admission has been explained in the chapters dealing with these two factors.

Self-supporting students.—Self-supporting students do not seem to suffer much in regard to lower scholarship in college, probably because they are a selected group of students in intelligence, or earnestness of purpose, or both. There is evidence to show, however, that such students are kept out of extracurricular activities in college. Therefore the counselor and

student must always balance the loss of participation in these extra physical, intellectual, and social activities against the need for work to continue in college. In individual cases it may be that it will be deemed better to remain out of school a semester or a year in order to make the next year in school a more complete one for the development of the student.

High-school marks.—Research indicates that high-school marks are one of the important indices of student accomplishment in the regular college work. The results showed that not only were high-school marks of value in predicting college scholarship as a whole, but that success in different high-school subjects could be used for differential prediction purposes. Marks in a high-school subject tended to have the highest relationship with the same subject in college. Relationship with success in other college subjects depended to some extent upon common intellectual traits. For example, mathematics has a higher correlation with science than with other subjects, and English correlates higher with foreign languages than with other subjects. It is believed that the differential relationship shown here makes it clearer than ever that guidance regarding the choice of individual subjects is important. Most of the previous investigators in this area confined their energy to determining the value for college success of different high-school subject patterns.[16] They found that the pattern of high-school subjects taken had only a slight relationship to college success. This fact led many to the more general conclusion that there is no differential prognostic value to be found in the high-school record. The present study shows that this general conclusion is unwarranted. Marks in different high-school subjects have differential predictive efficiency and should therefore be the object of scrutiny by those who have to do with the guidance of entering college freshmen.

Aptitude and achievement test results.—The scholastic aptitude test and other aptitude and achievement tests are valuable aids in the guidance field, mostly because of the ease with which the result, i. e., the test score, is obtained and interpreted. Although it is true that guidance based on a single test score cannot be very accurate, the test score does represent, time and effort considered, the most efficient single item to be used in guidance. Since scores are efficient units for statistical manipulation, the relation of intelligence and other more specialized traits with other factors can be more easily shown. Marks, for example, must often be reduced to comparable terms and averaged before they can be used easily in statistical manipulation. Again, marks are often made up from very subjective ratings the reliability of which is open to question. Tests can cover more

[16] By pattern is meant the subjects studied in high school and the number of units taken of each. Except for certain constants, such as 2 years of English, almost any high-school subject can be omitted and the student can still enter some college. The result is that there is a great variety in the patterns of subjects and the number of units in the different subjects offered for college entrance.

definite fields of student knowledge and skill. For these reasons the use of tests must necessarily increase rather than decrease in the guidance of college students.

General conclusions.—Besides the specific implications discussed in this chapter arising out of particular portions of the data, several general conclusions seem inevitable:

(1) There is need for a more comprehensive system of record keeping in the high school, so that more pertinent data can be used in the guidance of the students by the high schools at the time of graduation and by colleges at the time of entrance to college.

(2) Colleges in admitting or guiding students should use as many items of knowledge concerning the student as possible.

(3) Colleges should set up facilities for testing and interviewing students in order to satisfy the need expressed in (2).

(4) An integration of the work of the high school and college is needed through (*a*) providing facilities for students of different levels of general scholastic apititude, and (*b*) providing for the placement of students in particular courses in accordance with their past achievement in high school.